

Entry of Amendment

Entry of the present response to the final rejection is respectfully requested. No amendments are presented. However, a Terminal Disclaimer is being filed concurrently herewith to obviate the obviousness-type double-patenting rejection. Accordingly, entry of this response is appropriate.

Double-Patenting Rejection

Claims 1-10 are rejected under the judicially created doctrine of obviousness-type double-patenting based on claims 1-7 of copending Application Serial No. 10/097,483 and claims 1-9 of copending Application Serial No. 10/115,141. The claims are also rejected over claims 1-24 of copending Application Serial No. 10/166,743 in view of either Beetle et al., Monroe et al., or Buchborn et al. Applicants respectfully traverse these rejections. In view of the accompanying Terminal Disclaimer, it is respectfully submitted that these rejections are overcome.

Rejections under 35 U.S.C. §103(a)

Claims 1-9 stand rejected under 35 U.S.C. §103(a) as being obvious over one of Beetle et al. (U.S. 3,302,919), Monroe et al. (U.S. 5,896,912), or Buchborn (U.S. 5,954,113) in view of Webbere (U.S. 2,770,860). The claims are alternately rejected as being obvious over Webbere in view of Beetle et al., Monroe et al., or

Buchborn. Claim 10 is rejected under 35 U.S.C. §103(a) as being obvious over the combination of these four references and further in view of Schekhter. These rejections are respectfully traversed. The Examiner states that Beetle et al., Monroe et al., and Buchborn each shows it is conventional to provide a feeder head and a casting mold for feeding molten metal into a mold cavity during the solidification process to prevent solidification defects, such as surface sink, from occurring. The Examiner also states that Webbere shows a deoxidizing compound in a mold to deoxidize the oxide film during the casting process. The Examiner further states that Schekhter et al. shows that an alkaline earth metal, such as magnesium gas, is a reduction agent.

Claim 1 describes a method of casting, where a feeder head is provided between a metal inlet and a cavity and in which the heat insulating of the feeder head is greater than that of the cavity so that the cooling rate of the feeder head is lower than that of the cavity, including the combination of steps of pouring a molten metal into the cavity, reacting the molten metal with a deoxidizing compound in the cavity so as to deoxidize the oxide film formed on a surface of the molten metal, and supplementing the molten metal in the feeder head to the cavity when the molten metal in the cavity has solidified and shrunk.

It is respectfully submitted that the cited references do not teach or suggest this combination of steps.

Even if the three references teach the general idea of casting in a die where a feeding head is insulated by pouring molten metal in a cavity and supplementing the molten metal as it solidifies and shrinks, they still do not teach the present combination of steps. In particular, these references do not teach or suggest reacting the molten metal with the deoxidizing compound in the cavity so as to deoxidize an oxide film formed on the surface of the metal.

This feature goes to the heart of the present invention, since removal of the oxide film allows the metal to flow freely, even as the metal in the cavity starts to solidify. It is the combination of the large difference in the cooling rate and the presence of the deoxidizing compound that permits the metal to continue to flow as long as necessary in order to feed the solidified cavity.

The Office Action cites Webbere to teach the idea of providing a deoxidizing compound in a mold. However, Applicants continue to submit that this reference does not show a deoxidizing compound. Webbere describes the use of fluorinated hydrocarbons as a process for "vapor fluxing" (column 2, line 2). This is also referred to (column 2, line 28) as an "active fluxing gas or vapor". Webbere never describes this gas as a "deoxidizing gas". The reference does state (column 3, line 25) that it is a "reactive gas".

However, Webbere does not state what is meant by "vapor fluxing", "active fluxing gas", or "reactive gas". The usual metallurgical meaning of flux is "substance which promotes the flow of a molten metal and prevents the formation of oxides". The term "active" or "reactive" can mean many things. The reference does state (column 3, line 26) that the chlorine and fluorine form a flux. It is assumed, therefore, that the term "reactive gas" means that the hydrocarbon gas reacts to form the flux, which prevents the oxide film in the surface of the metal. Again, however, nowhere does Webbere teach or suggest that this flux acts to "deoxidize" the film rather than merely prevent it from oxidizing. As a result, it is submitted that Webbere does not teach or suggest the use of a deoxidizing compound as suggested in the Office Action. Since this reference does not teach or suggest the use of a deoxidizing compound, the combination of any of the four references also does not teach or suggest this concept. Claim 1, therefore, is not obvious thereover.

Claims 2-10 depend from claim 1 and, as such, are also allowable. In addition, the dependent claims also recite other features not described in any of the cited references. Thus, claim 2 describes the cooling rate of a cavity which is not specified in any of the references. Likewise, claim 3 recites the average clearances between dendrites of the aluminum which is not described

or suggested in the references. Claim 4 describes that the interface is free of lubricant which is not described in any of the references. Claim 6 describes the specific temperature while casting. Claim 8 requires that an adapter is detachably attached to the cavity, which is not described in the references. Claim 9 describes the adapter as having two paths, which is also not described in the references. Claim 10 describes the deoxidizing compound as a magnesium nitride compound formed by reacting magnesium gas with nitrogen gas. Accordingly, these claims are considered to be additionally allowable.

Claim 10 is rejected under 35 U.S.C. §103(a) as being obvious over the above-noted combination of four references and further in view of Schekhter et al. The Office Action contends that Schekhter et al. shows that the use of magnesium gas as a reducing agent. However, this reference does not teach or suggest the use of a magnesium nitride compound, but rather magnesium gas itself. Furthermore, this reference does not show that a magnesium nitride compound is formed by reacting magnesium gas with nitrogen gas. Accordingly, Applicants submit that claim 10 is additionally allowable.

Conclusion

In view of the above remarks, it is believed that the claims clearly distinguish over the patents relied on in the Office Action, either alone or in combination. In view of this, reconsideration of the rejections and allowance of all the claims are respectfully requested.

If there are any outstanding issues, however, the Examiner is invited to telephone Robert F. Gnuse, Reg. No. 27,295, at (703) 205-8000 in an effort to expedite prosecution.

Pursuant to 37 C.F.R. §§ 1.17 and 1.136(a), Applicants respectfully petition for a one-month extension of time in which to file this reply. A check including the required fee of \$110 is attached.


If necessary, the Commissioner is hereby authorized in this, concurrent, and future replies, to charge payment or credit any overpayment to Deposit Account No. 02-2448 for any additional fees

required under 37 C.F.R. §§ 1.16 or 1.17; particularly, extension of
time fees.

Respectfully submitted,

BIRCH, STEWART, KOLASCH & BIRCH, LLP

By



James M. Slattery, #28,380

for

P.O. Box 747

Falls Church, VA 22040-0747

(703) 205-8000

#43,368

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Attachments

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